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United States Department of Agriculture,

FORESTRY DIVISION.

Instructions for the Collection of Test Pieces of Pines for Timber Investigations.

A.—OBJECT OF WORK.

The collector should understand that the ultimate object of these investigations is, if possible, to establish the relation of quality of timber to the conditions under which it is grown. To accomplish this object he is expected to furnish a very careful description of the conditions under which the test trees have grown, from which test pieces are taken. Care in ascertaining these and minuteness and accuracy of description are all-important in assuring proper results. It is also necessary to select and prepare the test pieces exactly as described and to make the records perfect as nearly as possible, since the history of the material is of as much importance as the determination in the laboratory.

B.—LOCALITIES FOR COLLECTING.

As to the locality from which test trees are to be taken, a distinction is made between station and site.

By station is to be understood a section of country (or any places within that section) which is characterized in a general way by similar climatic conditions and geological formation. "Station," then, refers to the general geographical situation. "Site" refers to the local conditions and surroundings within the station from which test trees are selected.

For example, the drift deposits of the Gulf Coast plain may be taken for one station; the limestone country of northern Alabama for a second. But a limestone formation in West Virginia, which differs climatically, would necessitate another station. Within the first station a rich, moist hummock may furnish one site, a sandy piece of upland another, and a wet savannah a third. Within the second or third station a valley might furnish one site, the top of a hill another, a different exposure may call for a third, a drift-capped ledge with deeper soil may warrant the selection of another.

Choice of stations.—For each species a special selection of stations from which test pieces are to be collected is necessary. These will be determined, in each case separately as to number and location, from this office. It is proposed to cover the field of geographical distribution of a given species in such a manner as to take in stations of climatic difference and different geological horizon, neglecting, how-

ever, for the present, stations from extreme limits of distribution. Another factor which will determine choice is character of soil, as dependent upon geological¹ formations. Stations which promise a variety of sites will be preferably chosen.

Choice of site.—Such sites will be chosen at each station as are usually occupied by the species at any one of the stations. If unusual sites are found occupied by the species at any one of the stations it will be determined by special correspondence whether test pieces are to be collected from it. The determination of the number of sites at each station must be left to the judgment of the collector after inspection of the localities; but before determining the number of sites the reasons for their selection must be reported to this office. The sites are characterized and selected by differences of elevation, exposure, soil conditions, and forest conditions. The difference of elevation which may distinguish a site is provisionally set at 500 feet; that is, with elevation as the criterion for choice of stations the difference must be at least 500 feet. Where differences of exposure occur a site should be chosen on each of the exposures present, keeping as much as possible at the same elevation and under other similar conditions. Soil conditions may vary in a number of directions, in mineral composition, physical properties, depth, and nature of the subsoil. For the present, only extreme differences in depth or in moisture conditions (drainage) and decided difference in mineral composition will be considered in making selection of sites.

Forest conditions refer, in the first place, to mixed or pure forest, open or close stand, and should be chosen as near as possible to the normal character prevailing in the region. If what, in the judgment of the collector, constitutes normal conditions are not found, the history of the forest and the points wherein it differs from normal conditions must be specially noted.

C.—CHOICE OF TREES.

On each site five trees are to be taken, one of which is to serve as “check tree.” None of these trees are to be taken from the roadside or open field, nor from the outskirts, but all from the interior of the forest. They are to be representative average trees—neither the largest or best nor the smallest or worst, preferably old trees and such as are not overtopped by neighbors.

The “check tree,” however, should be selected with special care and should represent the best developed tree that can be found, judged by relative height and diameter development and perfect crown.

The distance between the selected trees is to be not less than 100 feet or thereabout, yet care must be exercised that all are found under precisely the same conditions for which the site was chosen.

There are also to be taken six young trees as described under “E.”

If to be had within the station, select two trees from 30 to 60 years or older, which are *known* to have grown up in the open, and two trees which are *known* to have grown up in the forest, but have been isolated for a *known* time of 10 to 20 years.

D.—PROCEDURE AND OUTFIT.

The station determined upon, the collector will proceed to examine it for the selection of sites. After having selected the sites, he will at once communicate the selection, with description and justification, to this office, negotiate with the owners of the timber (which might be done conditionally during the first examination) for the purchase or donation of test trees; and the latter arrangements completed,

without waiting reply from this office, he will at once proceed to collect test pieces on one of the sites, in regard to the selection of which he is not in doubt.

To properly carry out the instructions, the following assistance and outfit may be required:

- (1) Two men* with ax and saw; a boy also may be of use.
- (2) Team, wagon, and log trucks for moving test pieces and log station.
- (3) Frow or sharp hacking knife for splitting disks. Heavy mallet or medium sized "maul" to be used with frow.
- (4) A hand saw.
- (5) Red chalk for marking. (A special marking hammer will be substituted.)
- (6) Tape line and 2-foot rule or caliper.
- (7) Tags (specially furnished).
- (8) Small staples to fasten tags.
- (9) Wrapping paper and twine.
- (10) Franks for mailing test pieces (specially furnished).
- (11) Shipping tags for logs.
- (12) Barometer for ascertaining elevations.
- (13) Compass to ascertain exposures.
- (14) Spade and pick to ascertain soil conditions.

E.—METHOD OF MAKING TEST PIECES.

(a) *Mature trees.*

- (1) Before felling the tree, blaze and mark the north side.
- (2) Fell tree with the saw as near the ground as practicable, avoid the flare of the butt, and make the usual kerf with the ax opposite to the saw, if possible, so as to avoid north and south side. If necessary square off the butt-end.

(3) Before cutting off the butt-log mark the north side on the second, third, and further log lengths.

(4) Measure off and cut logs of merchantable length and diameters, beginning from the butt, noting the length and diameters in the record.

Should knots or other imperfections, externally visible, occur within 8 inches of the log mark, make the cut lower down or higher up to avoid the imperfection.

(5) Continue measuring the full length of the tree and record its length. Note also distance from the ground and position on the tree (whether to the north, south, west, or east) of one large sound limb. Mark its lower side and saw it off close to the trunk and measure its length and record it; the limb to be utilized as described later.

If the tree after felling prove unsound at the butt, it will be permissible to cut off as much or as little as necessary within the first log-length. If sound timber is not found in the first log, the tree must be discarded. Only sound timber must be shipped. Any logs showing imperfections may be shortened. Be careful to note change in position of test pieces. The number of logs to be taken will be determined by special instructions.

(6) Mark on butt-end of each log the north and south line, writing the letter *N* on the north, and the letter *S* on the south side; also the number of the tree (Arabic), and the serial number (Roman) of the disk in the tree, beginning with

*Only men familiar with felling and cutting timber should be chosen.

No. 1, at the butt-log. Write the same data on a card, and tack this fast with light staples. Now saw off squarely from the butt-end of each log a disk 6 inches long, and beyond the log measure cut off similar disks every 10 feet up to 2-inch diameter.

Box the entire disk, firmly tying double thickness of wrapping paper on each face if large, or entirely wrapping the piece if small.

(7) Repeat on the new face of each butt-end the same marks as given under (6). Tack to the butt-end of each log securely a card (centrally), on which is written name of tree, species, locality from which tree is taken, denoted by the letter corresponding to that used in the note-book, number of tree and section. This card or tag is intended to insure a record of each log in addition to the marking already made.

(8) *Limb wood*.—Having, as before noted, selected a limb, measured and recorded its distance from the butt and position on the trunk, and marked its lower side and sawed it off close to the latter, now take a disk 6 inches long from the butt-end and others every 3 feet up to 2-inch diameter at the top. Number these consecutively with Roman number, calling the butt disk No. 1.

Before sawing off, mark the lower side of the limb on each disk by a cut with the hatchet, and place the (Arabic) number of the tree, from which the limb came, on each. Enforce the record by cards containing the same information.

(9) *Young trees*.—Select six trees from each site, approximately of the following sizes: Two, 6-inch diameter, breast high; two, 4-inch diameter, breast high; two, 2-inch diameter, breast high. Mark north and south sides and chop or saw all close to ground and cut each tree into following lengths: First stick, 2 feet long; second stick, 4 feet long; the remaining cuts 4 feet long up to a top end diameter of about 1 inch. Cut from the basal end of each log a disk 6 inches long.

Mark, ticket, wrap, and ship in the same way as the disks of the large trees. Of these trees only the disks are used.

F.—SHIPPING TEST PIECES.

Ship all pieces without delay. To each log tack securely a shipping card (furnished), so as to cover the marking tag. The logs will go to J. B. Johnson, St. Louis, Mo. The disks and other pieces are to be shipped to F. Roth, Ann Arbor, Mich.

Mail at once to the above addresses notice of each shipment, and a transcript of notes and full description to this office, from which copies will be forwarded to the recipients of the test pieces.

If free transportation is obtained from the railroad companies, special additional instructions will be given under this head.

G.—RECORDS.

Careful and accurate records are most essential to secure the success of this work. A set of specially prepared record sheets will be furnished, with instructions for their use. A transcript of the record must be sent to this office at the time of making shipment; also such notes as may seem desirable to complete the record and to give additional explanations in regard to the record and suggestions respecting the work of collecting. Original records and notes must be preserved, to avoid loss in transmission by mail.

